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**Name of Organization:** Bois Forte Indian Reservation

**Type of Organization:** Tribal Organization

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**Project Title:** Great Lakes, wild rice, & bioaccumulative toxics

**Project Category:** Pollution Prevention and Reduction - BNS

**Rank by Organization (if applicable):** 0

**Total Funding Requested (\$):** 96,724 **Project Duration:** 1 Years

**Abstract:**

We propose to assess the presence and level of bioaccumulative toxics, including mercury, lead, and arsenic in wild rice plants in selected lakes of the Great Lakes basin. The lakes that will be examined include Stone Lake (T58N, R12W), Campers Lake (T60N, R1OW), Cramers Lake (T58N, R6W), Round Island Lake (T59N, R8W), Cabin Lake (T59N, R7W), Marsh Lake (T62N, R4W), and Breda Lake (T56N, R12W). These lakes fall within the Lake Superior Basin. Determining the presence and levels of these toxic metals is a priority concern for the Chippewa Indian Communities, particularly for the Bois Forte and Grand Portage Indian Reservation Communities who reside within or adjacent to the Great Lakes watershed. The project will develop data that will help answer the growing concern in these communities about the risks of consuming wild rice and about declines in wild rice ecosystems, as well as providing information about the distribution of such toxics across the Minnesota portion of the Great Lakes basin. This project fits the Great Lakes priorities because it addresses issues directly related to both the Binational Toxics strategy and Ecological Protection and Restoration. Project objectives are to: (1) assess the presence and level of mercury, lead, and arsenic in the selected lakes identified above; (2) determine the presence and level of these metals in fresh and processed wild rice kernels; (3) determine differences in the distribution of mercury, lead, and arsenic among the lakes under study, and if differences are found, extend the research to include the analysis of these metals in sediments; and (4) disseminate the results of the study through open meetings and distribution of educational materials for reservation communities, and sharing of research results with state and other tribal resource management agencies.

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**Geographic Areas Affected by the Project**

**States:**

<input type="checkbox"/> Illinois	<input type="checkbox"/> New York
<input type="checkbox"/> Indiana	<input type="checkbox"/> Pennsylvania
<input type="checkbox"/> Michigan	<input type="checkbox"/> Wisconsin
<input checked="" type="checkbox"/> Minnesota	<input type="checkbox"/> Ohio

**Lakes:**

<input checked="" type="checkbox"/> Superior	<input type="checkbox"/> Erie
<input type="checkbox"/> Huron	<input type="checkbox"/> Ontario
<input type="checkbox"/> Michigan	<input type="checkbox"/> All Lakes

**Geographic Initiatives:**

<input type="checkbox"/> Greater Chicago	<input type="checkbox"/> NE Ohio	<input type="checkbox"/> NW Indiana	<input type="checkbox"/> SE Michigan	<input type="checkbox"/> Lake St. Clair
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**Primary Affected Area of Concern:** St. Louis River, MN

**Other Affected Areas of Concern:** Stone Lake (T58N, R12W), Campers Lake (T60N, R10W), Cramers Lake (T58N, R6W), Round Island Lake (T59N, R8W), Cabin Lake (T59N, R7W), Marsh Lake (T62N, R4W), and Breda Lake (T56N, R12W).

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***For Habitat Projects Only:***

**Primary Affected Biodiversity Investment Area:** Not Applicable

**Other Affected Biodiversity Investment Areas:**

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**Problem Statement:**

We propose to assess the presence and level of bioaccumulative toxics, mercury, lead, and arsenic, in wild rice plants in selected lakes of the Great Lakes basin. Completing these assessments is a priority concern for the Chippewa Indian Communities who reside within or adjacent to the Great Lakes watershed. The project will develop baseline data that will be useful to address present and possible future concerns about the risks of consuming wild rice, about declines in wild rice ecosystems, and about the distribution of such toxics across the Minnesota portion of the Great Lakes basin. The proposed work fits the Great Lakes priorities because it addresses issues directly related to both the Binational Toxics strategy and Ecological Protection and Restoration.

This research is important for both ecological and environmental justice reasons. Regarding ecological health, wild rice ecosystems are unique and globally significant fresh water communities and harbor the only aquatic cereal grain endemic to North America. However, a variety of perturbations have triggered the disappearance of approximately 50% of native wild rice beds in Minnesota. Regarding environmental justice, wild rice continues to this day to be central to the economic, cultural, and spiritual life of many Chippewa communities in northern Minnesota. Members of the Bois Forte and Grand Portage Indian reservations use many lakes (e.g., Campers Lake, Cramers Lake, Round Island Lake, and Cabin Lake) within the Great Lakes Basin for ricing. More than 40% of the 600 or so residents of Bois Forte Reservation Band members harvest wild rice each year. The dependence on harvesting wild rice in these lakes of the Great Lakes basin is even stronger at Grand Portage, which is located within the basin, but has no wild rice bearing lakes within its boundaries. Clearly, with unemployment as high as 60%, wild rice is an important source of food and income for a significant number of people in both reservations.

However, the productivity and quality of wild rice beds in the Great Lakes watershed is declining rapidly. A wild rice survey conducted by the 1854 authority in collaboration with the Grand Portage, Bois Forte, and Fond du Lac reservations, found wild rice beds in many of the above-mentioned lakes to be increasingly smaller and fragmented; plant density and grain size have diminished significantly. In many of these lakes where there was once abundant wild rice, perennial invasive weeds now exist. Open water has replaced many once plentiful wild rice beds. Although a variety of landuse practices and climatic variations are implicated in the decline of wild rice in these lakes, fragmentary data elsewhere suggest that bioaccumulative toxics such as mercury, lead, and arsenic may play a role in this overall decline. For instance, exploratory work to determine the presence of lead and arsenic in wild rice plants at Nett Lake has shown that wild rice plants do indeed absorb these metals. Moreover, the data also suggest a difference in the productivity of wild rice between areas of the lake with high and low levels of these substances in the sediments. Mercury also has been shown to affect the growth and productivity of wild rice. However, systematic information on the presence, level, and effect of mercury, lead, and arsenic on wild rice in lakes within the Great Lakes watershed is lacking. There is also a growing concern among the community of harvesters in both reservations that the wild rice they harvest in these lakes may be contaminated

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by these bioaccumulative toxics and therefore not suitable for human consumption. Yet we do not have any data regarding the presence and level of these metals in wild rice kernels that will help address these concerns.

The objectives of this proposal are to: (1) assess the prevalence of lead, arsenic, and mercury in selected wild rice lakes of the Great Lakes watershed; (2) determine the presence of these metals in wild rice kernels in the selected lakes; (3) compare differences in the distribution of mercury, lead, and arsenic among the lakes under study; and (4) disseminate the results to the concerned communities and state and tribal management agencies through open forums, meetings, and workshops, publication of educational materials, and preparation of journal articles.

**Proposed Work Outcome:**

Objective 1: assess the presence and level of lead, arsenic, and mercury in wild rice plants of selected lakes of the Great Lakes watershed.

We will sample wild rice plants from Stone Lake (T58N, R12W), Campers Lake (T60N, R10W), Cramers Lake (T58N, R6W), Round Island Lake (T59N, R8W), Cabin Lake (T59N, R7W), Marsh Lake (T62N, R4W), and Breda Lake (T56N, R12W). These basins fall within watersheds directly adjacent to Lake Superior. The samples will be used to assess the presence and level of mercury, lead, and arsenic in wild rice plants. From each lake, we will take 30 samples, stratified according to density and distribution, using a 0.5sqm quadrat. Samples will be taken at physiological maturity of the wild rice plant (i.e., late August to end of September). Within each quadrant, we will record standard agronomic measurements. These will include plant height from water surface and from sediment, density, number of tillers per plant, and rice kernel yield. We will select randomly 2-3 quadrats per lake and assemble a composite sample of wild rice plants (excluding kernels) from which appropriate sub-samples will be taken for laboratory analysis of lead, arsenic, and mercury. Two independent laboratories will analyze split samples to ensure the validity of results. Laboratory results will be compared with existing literature on the toxicity of lead, arsenic, and mercury on wild rice plants.

Objective 2: determine the presence and concentration of mercury, lead, and arsenic in wild rice kernels.

Using the same sampling procedure used in objective 1 but focusing only on wild rice kernels, we will conduct a laboratory analysis to determine the presence of mercury, lead, and arsenic in the kernels. Sub-samples of collected kernel will also be subject to finishing processes (i.e., prepare as normally done for human consumption) and tested for presence of these bioaccumulative toxics in order to identify if processing affect levels of these metals. Laboratory findings will be compared with existing literature on the toxicity of these bioaccumulative toxics to human health.

Objective 3: compare differences in the distribution of mercury, lead, and arsenic among the lakes under study

We will compare the distribution of mercury, lead, and arsenic across the lakes under study. If significant differences are detected between basins, we will evaluate the concentration of these metals in sediments supporting wild rice beds. Information thus obtained will provide baseline information for a systematic study of the contaminant sources of these lakes.

Objective 4: Dissemination of research results.

We will disseminate our research results using four strategies. We will: 1) hold public meetings in both reservations to present the outcomes of the research; 2) produce and distribute a short educational brochure on the relationship between wild rice, heavy metals, and human health; 3) post our research results and the educational material on a web site and link it to various web sites of Chippewa communities in northern Minnesota for broader dissemination; and 4) prepare a journal article for a peer-reviewed journal.

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**Project Milestones:****Dates:**

Preparation of survey plan	08/2000
Sample collection	09/2000
Sample analysis	12/2000
Writing research results	02/2001
Preparation of educational materials	03/2001
Seminar & public forum planning	04/2001
Seminars, forums, web, & edu. materials	06/2001
Project End	07/2001

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☒ Project Addresses Environmental Justice

**If So, Description of How:**

The proposed project addresses an environmental justice concern because Chippewa communities, more than any other community in the US, depend on wild rice for food, cash, and cultural purposes. Bioaccumulative toxics, therefore, are a disproportionately higher health risk for these communities. Moreover, a decline in the productivity of wild rice has a direct and disproportionate impact on people's livelihood in these communities.

☒ Project Addresses Education/Outreach

**If So, Description of How:**

Several educational/outreach activities will be carried out both at Bois Forte and Grand Portage Indian Reservations. We will organize and conduct public seminars in both reservations to inform the public about the research findings. For a broader dissemination, we will distribute educational materials throughout the rice growing regions of MN and Wisconsin (through established extension infrastructure) and post the results on a website and link it to various existing websites of Tribal and State agencies.

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**Project Budget:**

	<b>Federal Share Requested (\$)</b>	<b>Applicant's Share (\$)</b>
<b>Personnel:</b>	37,000	0
<b>Fringe:</b>	7,545	0
<b>Travel:</b>	4,550	0
<b>Equipment:</b>	3,000	0
<b>Supplies:</b>	0	3,500
<b>Contracts:</b>	20,000	0
<b>Construction:</b>	0	0
<b>Other:</b>	3,500	2,500
<b>Total Direct Costs:</b>	75,595	6,000
<b>Indirect Costs:</b>	21,129	0
<b>Total:</b>	96,724	6,000
<b>Projected Income:</b>	0	0

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**Funding by Other Organizations (Names, Amounts, Description of Commitments):**

Right now there are no other funding commitments made to this project.

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**Description of Collaboration/Community Based Support:**

This project is a collaborative effort of the following institutions.

Bois Forte Indian Reservation  
Institute for Social, Economic, and Ecological Sustainability (ISEES)--University of Minnesota  
Grand Portage Indian Reservation  
Minnesota Department of Natural Resources  
Minnesota Pollution Control Agency  
1854 Authority